



May 7, 2003

Mr. Michael Sarros
Hazardous Materials Manager
Virginia Department of Transportation
1700 North Main Street
Suffolk, Virginia 23434-4322

Re: Response to Navy Comments
Proposed Dewatering at Manhole CA-58
VDOT I-564 Intermodal Connector
Naval Station Norfolk
Norfolk, Virginia
VDOT Project No. R000-122-108, RW201
MM&A Project No. H0057

Dear Mr. Sarros:

Marshall Miller & Associates, Inc. (MM&A) prepared this response to comments from the Department of the Navy (Navy) regarding dewatering for a communications manhole enlargement for the above referenced Virginia Department of Transportation (VDOT) road project. MM&A evaluated dewatering effects on hydraulic containment of the Navy's Camp Allen Landfill plume as described in the *Groundwater Modeling Assessment, VDOT I-564 Intermodal Connector, Proposed Manhole CA-58 Enlargement* (January 16, 2003). The Navy received comments from their consultant (CH2MHILL) in a letter dated February 6, 2003. The Navy provided VDOT with concurrence of the modeling assessment with the stipulation that comments are addressed from CH2MHILL, see **Attachment I** for correspondence. Provided below are the Navy comments and the responses that VDOT should consider.

Comment #1

Page 2, paragraph 5 states that the modeling simulation was based on pumping the dewatering wells at a continuous rates of 48 gallons per minute for 42 days. Therefore, if

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the dewatering operation exceeds either a 48 gallons per minute flow rate or a 42-day duration, the assessment of the impacts on the hydraulic containment of the CALF plume would need to be re-evaluated.

Response #1

Yes, VDOT should not pump greater than 48 gallons per minute or longer than 42 days without additional assessment.

Comment #2

Page 3, paragraph 1 states "particle tracking of induced groundwater migration near the Navy's extraction wells appears negligible". However, Figure 4 shows that without dewatering, the groundwater flow direction from a location 200 feet northwest of the extraction wells is towards the extraction wells whereas with dewatering (Figure 6), the flow is no longer towards the extraction wells.

Response #2

Figure 4 cannot be compared directly with Figure 6. Figure 4 reflects long-term, steady-state conditions, whereas Figure 6 reflects short-term, temporary conditions. In Figure 4, each arrow point represents one year of migration. The flow paths presented in Figure 4 represent travel times of several years up to approximately 20 years. A more appropriate comparison to Figure 6 (42-day period with manhole dewatering) is Figure 5 (42-day period without manhole dewatering). By comparing Figures 5 and 6, no discernible movement of groundwater occurs near the extraction wells over a 42-day period with or without manhole pumping.

Comment #3

Appendix IV, Figures 2 through 7. These figures do not indicate whether or not the extraction wells were operational at the flow rates shown in Figure 6-1 of Appendix A of the modeling report. The modeling needs to demonstrate the dewatering conditions during operation of the extraction wells.

Response #3

Yes, the extraction wells were operational at the flow rates shown in Figure 6-1. Page 7 of report states that “..active groundwater extraction wells (remediation wells) continued to operate during the transient flow model at the same pumping rates that were maintained during the steady-state model.”

Comment #4

Appendix IV, Figure 5 shows that the groundwater contours do not appear to be affected by the pumping of the extraction wells. The capture zones for the extraction wells should be illustrated on this figure.

Response #4

The groundwater contours presented in Figure 5 are essentially the same as those shown in Figure 1 and 5-13. The contours in all three figures (Figure 1, 5, and 5-13) are all affected by the extraction wells. The impact of the extraction wells on the contours in Figure 5 is not as discernible as in the other figures because the contour interval (CI) in Figure 5 is 1 foot whereas the CI in the other two figures (Figures 1 and 5-13) is 0.2 feet. Figure 5 contained a larger CI to better depict particle tracking results. Regarding the comment of illustrating extraction well capture zones on Figure 5, please refer to Response # 5 below.

Comment #5

Appendix IV, Figure 7 should also illustrate the capture zone of the extraction wells since an objective of the modeling (stated on page 1 of the modeling report) is to demonstrate that the extraction well capture zones are not adversely impacted by the dewatering. This figure should then be compared to the capture zones of the extraction wells without dewatering, to be shown on Figure 5.

Response #5

Figures 5 and 7 (short-term, temporary conditions) cannot be compared directly with long-term extraction well capture zones that are steady-state conditions. Within "steady-state" capture zones such as on Figure 6-1, years are required for groundwater to migrate to the extraction wells. Manhole dewatering will occur in 42 days or less which is a much shorter time period than those represented by the "steady-state" capture zones. If plotted, the 42-day capture zones of the extraction wells (with or without manhole dewatering), would be very small, probably no bigger than the symbols representing the extraction wells. Our approach was to present a more meaningful analysis of the impact of manhole pumping on groundwater flow direction and velocity near the extraction wells through particle tracking.

Recommendation #1

As stated in the Technical Memorandum Requirement for the I-564 Intermodal Connector Project In the Camp Allen Area, groundwater level measurements are to be collected twice per day from at least two monitoring wells located within 100 feet of the dewatering wells. It is recommended that one of the wells be installed 100 feet to the southeast of the dewatering wells. If during dewatering, the water level draw down at this location exceeds 3.0 feet, as shown in Figure 2 (indicating a larger capture zone than estimated by the model), then dewatering needs to be shut down and the modeling needs to be re-evaluated at that time.

Response to Recommendation #1

Section 3.1.5 of the technical memorandum did specify collecting groundwater level measurements from two wells within a 100-foot radius of a dewatering location. However, the above comments are solely recommendations regarding both the placement of monitoring wells and the 3.0 foot drawdown criteria at a 100-foot radius. One potential concern with the recommendations is that a monitoring well installed 100 feet southeast of the dewatering area would place it in the Camp Allen Salvage Yard (CASY). Another concern with the recommendations is that predictions of drawdown closer to a pumping

location are more inaccurate due to: 1) steeper hydraulic gradients, 2) disparities between the geometry of a modeled cell block and an array of well points and 3) more drastic responses from heterogeneities in geological material and variations in pumping rates. For these reasons, monitoring groundwater levels 100 feet from the manhole with a 3.0 foot drawdown criterion is alone not a good indicator of the size of the capture zone produced by dewatering and should not be the deciding factor.

Monitoring should be conducted closer to the area of concern (i.e., the extraction wells on Figure 6-1). We propose using existing shallow monitoring wells for measuring drawdown such as B-MW8A (located approximately 475 feet southeast of the manhole) and A-MW12 (located approximately 550 feet southwest of the manhole). These two monitoring wells are deemed better locations to monitor potential influences on both the eastern and western networks of shallow extraction wells shown on Figure 6-1. The maximum predicted drawdown from manhole dewatering near these two wells was estimated as 1.0 feet at B-MW8A and 0.5 feet at A-MW12 from Figure 2. Note the modeling simulations that produced those drawdown estimates indicated no adverse effect on the Navy's capture zones. Based on the distance of the Navy's extraction wells from the manhole and the set period of time allowed for pumping of 42-days, additional limited drawdown at these two wells would also most likely not adversely effect the Navy's capture zones. Should actual drawdown measurements at these wells exceed estimated values by an amount deemed substantial, such as greater than 0.5 feet, then additional groundwater modeling should be considered. Therefore, additional groundwater modeling may be conducted should drawdowns exceed 1.5 feet and 1.0 feet at B-MW8A and A-MW12, respectively.

Allowances should be made for variations in groundwater levels such as natural fluctuations of the water table from precipitation and potential tidal influences. Therefore, groundwater should be measured in 1) monitoring wells chosen as dewatering observation points prior to pumping to establish background trends in water levels, 2) distant shallow wells to observe natural fluctuations from rainfall during pumping (such as A-GW2 located 1,080 feet to the south-southwest) and 3) shallow wells near Boush

Creek to observe potential tidal influences during pumping (such as AMW-17A located 1,450 feet to the east).

Recommendation #2

It is also recommended that groundwater samples be collected from the well referenced above every two weeks and analyzed for VOCs within 48 hours of sample collection.

Response to Recommendation #2

VDOT should be aware that this is a recommendation and not a requirement. The technical memorandum only specified testing groundwater for dewatering conducted outside the plume, whereas the CA-58 manhole is inside the plume.

MM&A appreciates the opportunity to provide VDOT with the groundwater modeling assessment of communications manhole CA-58. Please forward a copy of this response letter to the Navy for their review. If we may be of further assistance, please contact our office.

Sincerely,

Marshall Miller & Associates, Inc.

Vince Alaimo

Vince Alaimo
Senior Scientist

James T. Martin, Jr.

James T. Martin, Jr.
Senior Scientist

Enclosures
cc: File H0057



Attachment I



DEPARTMENT OF THE NAVY

COMMANDER
NAVY REGION, MID-ATLANTIC
6506 HAMPTON BLVD.
NORFOLK, VA 23508-1273

IN REPLY REFER TO:

11100

RE 282/238

Mr. Andrew G. Winch
Virginia Department of Transportation
1700 North Main Street
Suffolk, VA 23434

SUBJECT: GROUNDWATER MODELING RESULTS FOR MANHOLE CA-58

Dear Mr. Winch:

In response to your letter dated January 22, 2002, the Commander, Navy Region, Mid-Atlantic Regional Engineer concurs with the dewatering operations as proposed in VDOT's Groundwater Modeling Assessment for Manhole CA-58 with the stipulation that all comments in the attached enclosure are addressed.

If you have any questions, please call my point of contact Agnes Sullivan, Transportation Systems Engineer, at (757) 322-3024.

Sincerely,

A handwritten signature in black ink, appearing to read "A. J. Cox", is written over the typed name.

A. J. COX
CDR, CEC, USN
By direction

Enclosure: 1. CH2MHILL letter

Copy to: LANTDIV, Environmental

**CH2MHILL**

CH2M HILL
5700 Thurston Avenue
Suite 120
Virginia Beach, VA 23455
Tel 757.460.0429
Fax 757.460.4592

February 6, 2003

Ms. Winona Johnson
Atlantic Division, Code EV22WJ
Naval Facilities Engineering Command
1510 Gilbert Street
Norfolk, VA 23511-2699

Re: Groundwater Modeling Assessment VDOT Manhole CA-58

Dear Ms. Johnson:

As per your request, we have reviewed the report entitled "Groundwater Modeling Assessment VDOT I-564 Intermodal Connector Proposed Manhole CA-58 Enlargement Camp Allen Area Naval Station Norfolk Virginia, January 16, 2003. The report was prepared by Marshall, Miller And Associates for Virginia Department of Transportation. Based on our review of the report we are providing the following comments and recommendations:

Comments:

Page 2, paragraph 5 states that the modeling simulation was based on pumping the dewatering wells at a continuous rate of 48 gallons per minute for 42 days. Therefore, if the dewatering operation exceeds either a 48 gpm flow rate or a 42 day duration the assessment of the impacts of dewatering on the hydraulic containment of the CAF plume would need to be re-evaluated.

Page 3, paragraph 1 states that "particle tracking of induced groundwater migration near the Navy's extraction well appears negligible". However, Figure 4 shows that without dewatering the groundwater flow direction from a location 200 feet northwest of the extraction wells is towards the extraction wells whereas with dewatering (Figure 6) the flow is no longer towards the extraction wells.

Appendix IV Figures 2 through 7. These figures do not indicate whether or not the extraction wells were operational at the flow rates shown in Figure 6-1 of Appendix A of the modeling report. The modeling needs to demonstrate the dewatering conditions during operation of the extraction wells.

Appendix IV Figure 5 shows that the groundwater contours do not appear to be affected by the pumping of the extraction wells. The capture zones for the extraction wells should be illustrated on this figure.

Appendix IV Figure 7 should also illustrate the capture zone of the extraction wells since an objective of the modeling (stated on page 1 of the modeling report) is to demonstrate that the extraction well capture zones are not adversely impacted by the dewatering. This figure should then be compared to the capture zones of the extraction wells without dewatering, to be shown on figure 5.

- 2 -

February 7, 2003

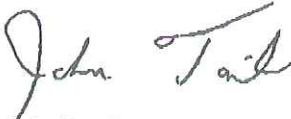
Recommendations:

As stated in the Technical Memorandum Dewatering Requirements for the I-564 Intermodal Connector Project In The Camp Allen Area, groundwater level measurements are to be collected twice per day from at least two monitoring wells located within 100 feet of the dewatering wells. It is recommended that one of the wells be installed 100 feet to the southeast of the dewatering wells. If during dewatering the water level drawdown at this location exceeds 3.0 feet, as shown in Figure 2 (indicating a larger capture zone than estimated by the model), then dewatering needs to be shut down and the modeling needs to be re-evaluated at that time.

It is also recommended that groundwater samples be collected from the well referenced above every two weeks and analyzed for VOCs within 48 hours of sample collection.

In summary, we recommend proceeding with the dewatering operation as proposed in the modeling report, assuming that the enclosed comments and recommendations are addressed. In addition, we recommend implementing the monitoring requirements that were stipulated in the Technical Memorandum Dewatering Requirements for the I-564 Intermodal Connector Project In The Camp Allen Area. Should you have any questions concerning the above please do not hesitate to contact me at 757-460-3734 ext.13

Sincerely,



John Tomik
Project Manager
CH2MHILL

cc: Holly Rosnick